

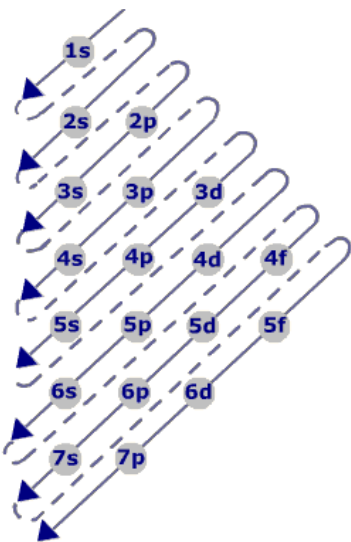
# Electron Configuration and Quantum Number Practice

Name \_\_\_\_\_

Use extra paper if necessary, all answer need to be in complete sentences and legible.

1. What are the quantum numbers?
2. What does the term principal quantum number refer to?
3. What is meant by the electron configuration of an atom?
4. If each orbital can hold a maximum of two electrons, how many electrons can each of the following hold?      a. 2s    b. 5p    c. 4f    d. 3d    e. 4d
5. How many s orbitals can there be in an energy level?
6. How many electrons can occupy an s orbital?
7. How many p orbitals can there be in an energy level?
8. Which is the lowest energy level that can have a s orbital?
9. Which is the lowest energy level that can have a p orbital?
10. Is it possible for two electrons in the same atom to have exactly the same set of quantum numbers?
11. How many d orbitals can there be in an energy level?
12. How many d electrons can there be in an energy level?
13. Which is the lowest energy level having d orbitals?
14. What is the first element to have a d orbital?
15. How many f electrons can there be in an energy level?
16. Which is the lowest energy level having f orbitals?
17. How many f orbitals can there be in an energy level?
18. How many energy levels are partially or fully occupied in a neutral atom of calcium, write out the orbital configuration first?
19. What is the maximum number of electrons that can be present in an atom having three principal energy levels?
20. What element has the following quantum numbers  $n = 5$ ,  $l = 2$ ,  $m_l = +2$   $m_s = +1/2$  ?

# Electron Configuration and Quantum Number Practice



## To write an electron configuration:

1. Determine the total number of electrons to be represented.
2. Use the Aufbau process to fill the orbitals with electrons. The Aufbau process requires that electrons fill the lowest energy orbitals first. In other words, atoms are built from the ground upwards.
3. The sum of the superscripts should equal the total number of electrons.

Example:  $^{12}\text{Mg } 1s^2 2s^2 2p^6 3s^2$

## 21. Orbital Diagrams & Longhand Electron Configuration

Use the patterns within the periodic table to **draw orbital diagrams** and **write longhand electron configurations** for the following atoms.

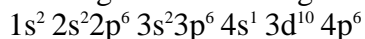
- a. oxygen    b. cesium    c. krypton    d. titanium    e. scandium    f. nitrogen  
g. chlorine    h. fluorine    i. arsenic    j. francium    k. selenium    l. copper  
m. potassium    n. antimony    o. thorium1    p. mercury

## 22. Rules of Electron Configurations

Which of the following “rules” is being violated in each electron configuration below? Explain your answer for each. *Hund’s Rule, Pauli Exclusion Principle, Aufbau Principle*

$\uparrow\downarrow$ 1s	$\uparrow\downarrow$ 2s	$\uparrow\downarrow$ _ _ 2p			
$\uparrow\downarrow$ 1s	$\uparrow\downarrow$ 2s	$\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ 2p	_ _ 3s	$\uparrow\downarrow\uparrow\uparrow$ 3p	
$\uparrow\downarrow$ 1s	$\uparrow\downarrow$ 2s	$\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ 2p	$\uparrow\uparrow$ 3s	$\uparrow\downarrow\uparrow\downarrow\uparrow$ 3p	
$\uparrow\downarrow$ 1s	$\uparrow\downarrow$ 2s	$\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ 2p	$\uparrow\downarrow$ 3s	$\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ 3p	$\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow\uparrow\downarrow$ 3d

23. What is wrong with the following electron configuration? Correct it and name the element.



24. Write the short hand configuration for all of the elements in problem 21.